

REMARKS

Claims 1-15 have been rejected. Claims 16-26 have been withdrawn from consideration and have been cancelled by the above amendment. Claims 1, 2, 5, 6, 7, 8, 9, 11 and 12 have been amended. New claims 27 to 29 have been added. Claims 1-15 and 27-29 are, therefore, presently pending in the application. Favorable reconsideration of the application in view of the following remarks is respectfully requested.

Support for new claims 27-28, that infrared dye is used instead of a colored dye to form an image, is implicitly inherent in the application as originally filed and all the examples. See, for example, page 1, lines 11-14, where it is stated: "In particular, the present invention comprises record shifting by means of employing at least one infrared dye in a color unit of the film, thereby forming at least one image record in the infrared region." (The "shifting" is from a visible color to the infrared, resulting in replacement of the conventional colored image by the infrared image.) It is submitted that it is implicit, as confirmed by the Examples, that the infrared dye is used in the color unit instead of, as is conventional, a color dye. Clearly, it makes no sense, in light of the specification, for both an infrared image and a color image to be formed. The entire thrust of the disclosure is to use the infrared image instead of a conventional color image. To further support that interpretation, the embodiments, described beginning on page 2, lines 26-30, all involve shifting one of the three color couplers to an infrared coupler, again obviously in effect replacing the color-dye former by (by changing it to) an infrared-dye former.

Basis for the new claims, particularly claim 29, can also be found in current claim 1; at page 5, line 23-ff; and in the Examples running from page 65 through page 71 of the specification. Here sample Element A has red, green and blue light sensitive layers units having image dye forming couplers 1, 2 and 3 which are shown to form cyan, magenta and yellow dyes respectively when photographically developed using developing agent D-1. In Element B, coupler 2 (magenta dye-forming with developing agent D-1) is "...replaced by..." coupler 4 (infra-red dye forming with developing agent D-1) in the green light sensitive layer unit. In Element C, coupler 1 (cyan dye-forming with developing agent D-1) is "...replaced by..." coupler 4 (infra-red dye forming with developing agent D-1) in the red light sensitive layer unit. Accordingly, in the disclosed inventive

demonstrations, the dye forming couplers in the image recording layer consists essentially of infrared-dye forming couplers. This image recording layer forms predominantly infrared density after photographic development. This follows inherently from the fact that a coupler in the comparative element A has been "...replaced by..." an infrared dye forming coupler in either Element B or Element C and not mixed with an infrared dye forming coupler. Table 2 at page 70 of the specification lists the hue of the image formed in the green light sensitive layer unit of Element B as shifting from 551.5 nm (green density) to 753.9 nm (infrared-density) and the hue of the image formed in the red light sensitive layer unit of Element C as shifting from 664.3 nm (red density) to 753.9 nm (infrared-density). The change in the measured modulation transfer function (MTF) of the films at 450n nm v 750 nm illustrates the improvement in image quality enabled by the inventive elements.

Rejection of Claims 5, 6, 8, 9 under 35 U.S.C. 112:

Claims 5, 6, 8, 9 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner states that claims 5 and 6 are indefinite with respect to the term "conventional," since there is no specific standard to differentiate between what is conventional and what is unconventional. Also, the Examiner states that the scope of protection sought for the "hue-shifting developing agent or precursor thereof" is indefinite since the specification fails to clearly define the scope thereof, and a few specific examples such as paraphenylenediamine developer fails to represent the entire scope of hue-shifting agent presented in claim 8. Finally, the Examiner states that the term "type" render claim 9 indefinite "type", Ex parte Copenhaver, 108 USPQ 118.

The above amendments to the specification are believed to obviate this rejection. In particular, the terms "conventional" and "type" have been deleted from the claims. With respect to "hue-shifting developing agent or precursor thereof," Applicant has amended this to recite a "developing agent or precursor thereof that shifts the hue of the dye formed by the cyan dye-forming coupler to an infrared dye." Thus, the developer D-2 on page 70 is shown, in the Examples to enable the shifting of cyan couplers to the infrared as well, as in other examples, shifting of IR couplers to the far infrared.

Rejection of Claims 1-7 and 11-14 under 35 U.S.C. §102(a):

Claims 1-7 and 11-14 have been rejected under 35 U.S.C. §102(a) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over JP4-866658 (JP'658). The Examiner states that JP'658 discloses a heat developable color photosensitive material containing a dye providing substance and an infrared dye forming coupler. The Examiner states that, on page 556, first column line 19, JP '658 discloses the use of the infrared dye forming coupler in a photosensitive silver halide layer containing a cyan dye; the use of a color developing agent such as paraphenylene compound is shown on page 565, second column; the heat developable color photosensitive material containing yellow, magenta and cyan coupler is shown in Table 2 on page 567. The Examiner further notes that JP'568 discloses therefore the use of an infrared dye forming coupler and a paraphenylene diamine type in a cyan coloring layer of a heat developable within the meaning at least one image recording layer in the recording layer units within the scope of claim 1 of the present claimed invention. Regarding claim 8, the Examiner states that the developing agent is similar type of that taught in the JP'658 discussed above, and that the hue-shifting due to the developing agent or precursor thereof is inherent to the infrared dye and the paraphenylene diamine type developing agent taught in the JP'658.

This rejection is respectfully traversed. The present invention is directed to a light-sensitive color photographic element comprising radiation sensitive silver-halide emulsion layers forming recording layer units for separately recording blue, green, and red exposures wherein at least one image record employs an infrared dye. A dependent claim further requires that the element comprises a blue light-sensitive layer unit having a magenta dye forming coupler, a green light-sensitive layer having a cyan dye forming coupler, and a red light-sensitive layer having an infrared dye forming coupler.

Thus, it is necessary, according to the present invention, that the infrared dye is an image forming dye responsive to a blue, green or red exposure in a photographic film. Infrared (IR) dyes and IR couplers are well known in the art for non-image forming purposes such as forming a movie soundtrack. The references do not disclose the use of an IR coupler for forming one of the three color images in a photographic film.

Thus, Applicants have found significant advantage for the color combination used in the present invention, in which an IR dye is used as one of three image dyes, the others being, for example, magenta, cyan, or yellow.

Further patentable aspects of the invention relate to a color photothermographic film comprising a blocked developer in the imaging layers.

The invention is particularly advantageous in a method comprising thermally developing an imagewise exposed photothermographic film element and then scanning the element, to form an electronic image representation of said imagewise exposure, which scanning occurs before removing any silver halide from the film, wherein at least one image record of the element employs an infrared dye for purposes of image formation.

Thus, the claims now recite that the photographic element (including a photothermographic element) or a specifically photothermographic element comprises at least one image recording layer that is capable of imagewise forming an infrared dye instead of a colored dye for recording the blue, green or red exposure. By the phrase "instead of" is meant that the infrared dye that is formed has the function that is typically performed by a magenta, cyan, or yellow dye in a conventional film. The infrared dye can be formed basically by one of two ways, either using an infrared coupler, as specified by claim 1, or by using a conventional colored coupler that is shifted to the infrared by the use of a developing agent such as D-2, mentioned above.

Thus, the present element comprises an element that, on development, comprises essentially only three basic image dyes, one of which is an infrared dye. Thus, it is possible, for example in one embodiment, to use two colored dyes and an infrared dye or, in another embodiment, one colored dye and two infrared (far and near), but not three colored dyes as in JP '658. In contrast to the present invention, JP'658 forms an infrared dye in addition to cyan, magenta, and yellow. The infrared dye in JP '658 is not taking the place of one of the one of the three colored image dyes.

Rejection of Claims 13-15 under 35 U.S.C. 103(a):

Claims 13-15 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (JP'658) as applied above and further in view of Bohan et al. ('470). The Examiner states that it would have been obvious to include the color masking coupler, permanent Dmin adjusting dyes and the optical density in

the material of Kato to limit scanning noise and improve the overall signal-to-noise characteristic of the film to be scanned.

This rejection is traversed for the reasons stated above with respect to claims 1-7 and 11-14, since claims 13 to 15 depend from claim 1.

Rejection of Claims 8-10 under 35 U.S.C. 102(b):

Claims 8-10 have been rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ishikawa et al (Ishikawa). The Examiner states that Ishikawa discloses a color photographic material containing a paraphenylenediamine compound similar to that of the present claimed invention, noting especially samples 2-3 in column 16, developer compound A, and column 19, claim 1, formula (l). The Examiner states that Ishikawa may not disclose the term "hue-shifting" such as presented in the present claimed invention; but the developer use therein has similar functional group, so that accordingly the property such as "hue-shifting" is inherent to the dye of Ishikawa.

This rejection is respectfully traversed. In addition to the reasons stated above with respect to JP '658, Ishikawa does not disclose a developing agent such as D-2 on page 70 of the present specification that is capable of hue shifting a conventional coupler, for example, to shift a conventional cyan coupler (which forms a cyan dye with a conventional, commercially used phenylene diamine developing agent) to an infrared coupler.

It is believed that the foregoing is a complete response to the Office Action and that the claims are in condition for allowance. Favorable reconsideration and early passage to issue is therefore earnestly solicited.

Attached hereto is a marked up version of the changes made to the claims by the current amendment. The attached page(s) is captioned "Version With Markings To Show Changes Made."

Respectfully submitted,



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Version With Markings To Show Changes Made

In the Claims:

Please cancel Claims 16 to 26 without prejudice.

Please amend Claims 1, 2, 5, 6, 7, 8, 9, 11, and 12 as set forth below:

-- 1. (Once Amended) A light-sensitive color photographic element for recording an image comprising a support and, coated on the support, a plurality of hydrophilic-colloid layers comprising radiation-sensitive silver-halide emulsions and forming image recording layer units for separately recording blue, green, and red exposures, wherein at least one image recording layer in the image recording layer units comprises an infrared dye-forming coupler instead of a colored dye-forming coupler for recording the blue, green or red exposure.

2. (Once Amended) The photographic or photothermographic element of claim 1 wherein the element comprises a blue light-sensitive layer unit having a magenta dye forming coupler, a green light-sensitive layer having a cyan dye-forming coupler, and a red light-sensitive layer having the infrared dye-forming coupler instead of a cyan dye-forming coupler.

5. (Once Amended) The photographic element of claim 3, wherein the element comprises only magenta, cyan and infrared dye-forming couplers in reactive association with a conventional developing agent.

6. (Once Amended) The photographic element of claim 5, wherein the conventional developing agent is a paraphenylene compound selected from the group consisting of 4-N, N-dialkylaminoanilines and 2-alkyl-4-N,N-dialkylaminoanilines.

7. (Once Amended) The photographic element of claim 4, wherein the photothermographic element comprises at least one blue light-sensitive layer comprising a magenta dye-forming coupler, at least one green light- sensitive

layer having a cyan dye-forming coupler, and at least one red light-sensitive layer having the infrared dye-forming coupler instead of a cyan dye-forming coupler.

8. (Once Amended) A light-sensitive color photographic element comprising a support and, coated on the support, a plurality of hydrophilic colloid layers comprising radiation-sensitive silver-halide emulsion forming recording layer units for separately recording blue, green, and red exposures, wherein the element comprises yellow, magenta and cyan dye-forming couplers and [a hue-shifting] developing agent or precursor thereof that shifts the hue of the dye formed by the cyan dye-forming coupler to an infrared dye.

9. (Once Amended) The photographic element of claim 8, wherein the hue shifting developing agent is of the-a paraphenylene diamine compound type.

11. (Once Amended) The photographic element of claim 1 comprising in which the only couplers present are a cyan dye-forming coupler, a near-infrared dye-forming coupler, and a far-infrared dye forming coupler.

12. (Once Amended) The photographic element of claim 1, wherein the element has only comprises-magenta, cyan and infrared dye-forming couplers in combination with a [hue-shifting] paraphenylene diamine developer or precursor thereof that shifts the hue of the cyan and infra-red dye-forming couplers to a near-infrared and far-infrared dye--

Please add the following new claims 27, 28, and 29:

-- 27. A light-sensitive color photothermographic element for recording an image comprising a support and, coated on the support, a plurality of hydrophilic-colloid layers comprising a blue light-sensitive layer, a green light-sensitive layer, and a red light-sensitive layer for separately image-wise recording blue, green, and red exposures, wherein at least one image recording layer is capable of imagewise forming, in reactive association with an incorporated developing agent or precursor thereof, an infrared dye, instead of a colored dye selected from the group consisting of a magenta, cyan, and yellow dye.

28. A light-sensitive color photothermographic element for recording an image comprising a support and, coated on the support, a plurality of hydrophilic-colloid layers comprising radiation-sensitive silver-halide emulsions and forming image recording layer units for separately recording blue, green, and red exposures, wherein at least one image recording layer in the image recording layer units is capable of forming, in reactive association with an incorporated developing agent or precursor thereof, an infrared dye instead of a colored dye; and wherein the element comprises a blue light-sensitive layer unit having a magenta dye forming coupler, a green light-sensitive layer having a cyan dye-forming coupler, and a red light-sensitive layer having the infrared dye-forming coupler instead of a cyan dye-forming coupler.

29. A light-sensitive color photographic element for recording an image comprising a support and, coated on the support, a plurality of hydrophilic-colloid layers comprising radiation-sensitive silver-halide emulsions and associated dye-forming couplers collectively forming image recording layer units for separately recording blue, green, and red image exposures, wherein dye-forming coupler for forming an image in at least one image recording layer in the recording layer units consist essentially of infrared dye-forming coupler. --